



# The Effect of Music on Running Pace, Heart Rate, and RPE

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## INTRODUCTION

We are interested in finding out if music has an effect on overall athletic performance. The variables that we are comparing are running pace, heart rate, and the rate of perceived exertion. Heart rate (HR) is the number of heartbeats per minute and is based on the number of contractions of the ventricles (the lower chambers of the heart). The Borg Rating of Perceived Exertion (RPE) is a way of measuring physical activity intensity level. Perceived exertion is how hard you feel like your body is working. The Borg RPE scale is from 6-20 as it roughly equates to 1/10 the heart rate of the healthy middle-aged male. This scale starts at 6, as 60 is roughly the resting heart rate of a healthy individual. The top end of the scale is a 20, which again approximates the maximum heart rate of 200. Note that actual resting and maximum heart rate values vary by individual and 60 to 200 are broad generalizations. For this study, the Borg rating will be converted to the 1 through 10 scale in order to make it easier for subject to report their RPE.

This can be beneficial to those training to run long distances, such as 5Ks, 10Ks, and half/full marathons. Runners, in particular may be interested in this study because we are focusing on increasing pace, which can improve their overall running time and mileage. In addition, while listening to music may be able to produce visible and physical effects on running pace, HR, and RPE, it can also be used as a motivating factor or a distraction factor for the runner.

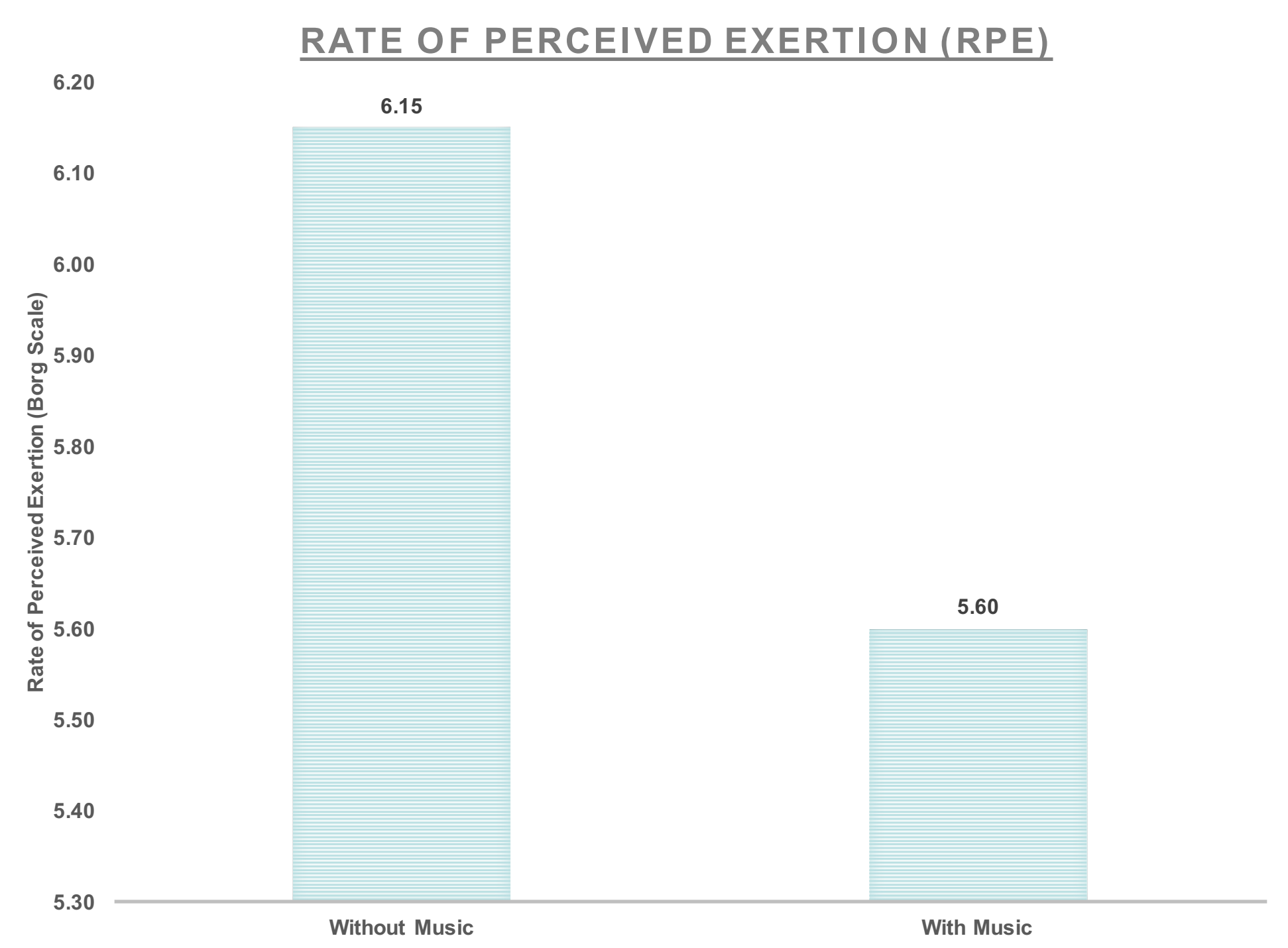
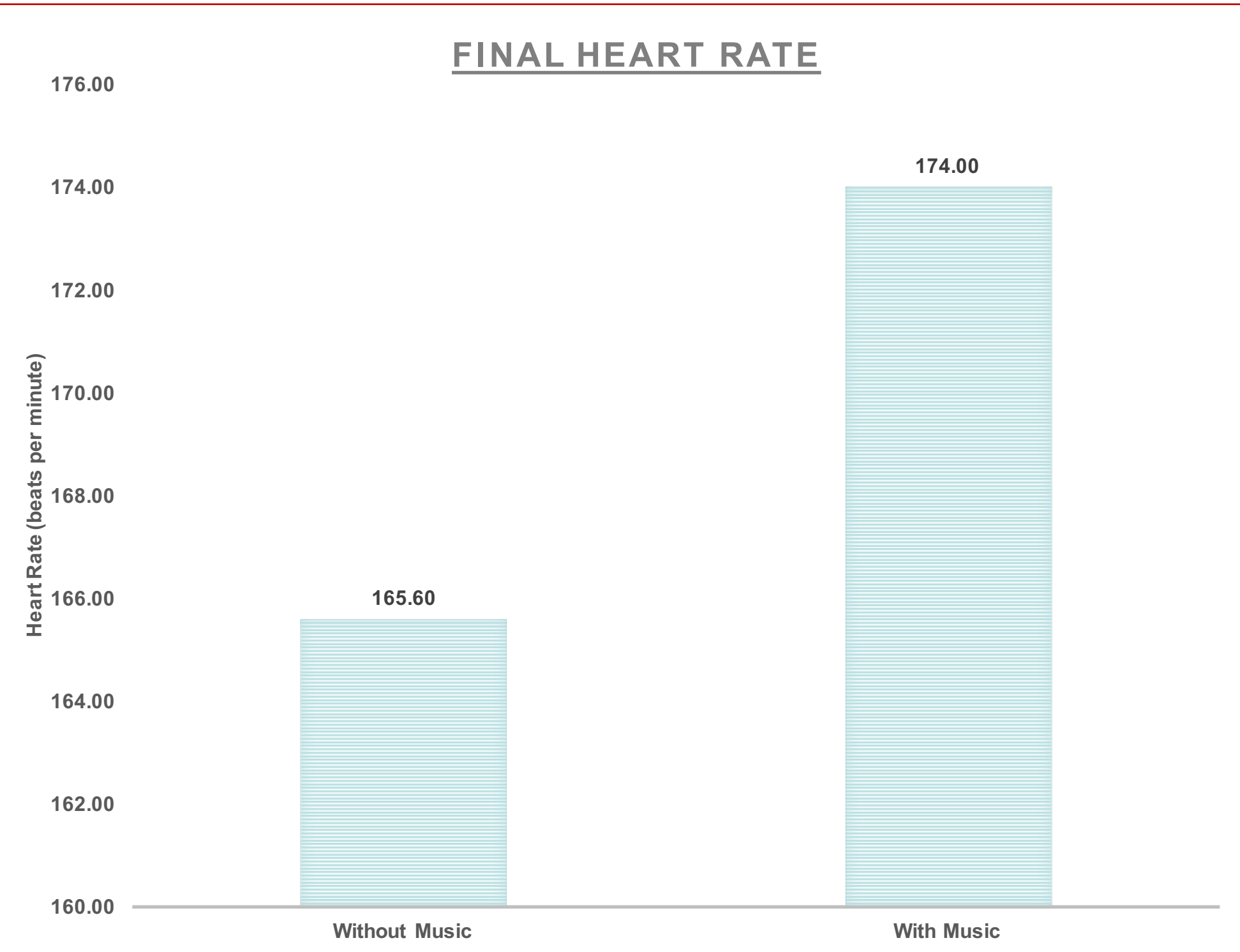
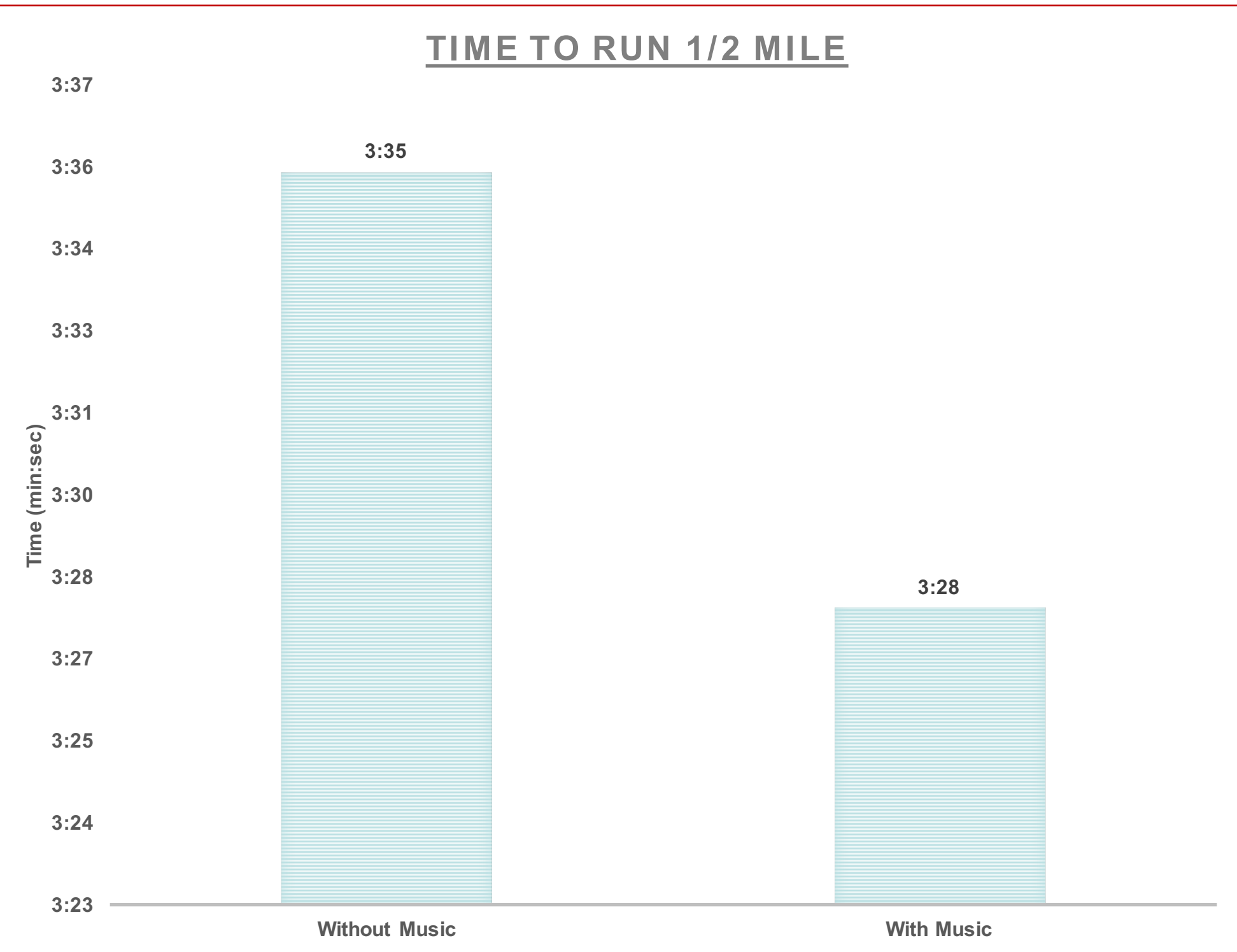
We want to compare these variables while our subjects listen to music versus no music. By comparing the effect of listening to music to the effect of not listening to any music on running pace, RPE and HR, we will be able to discover both the benefits and setbacks of running with music. Our primary hypothesis is that the utilization of music as a form of sensory deprivation will have a significant impact on the RPE as well as on overall performance and running pace.

## METHODS

Twenty college-aged male and female students, chosen through non-probability purposive sampling, will run ½ mile while listening to “Call on Me - Ryan Riback Remix” on one day and run ½ mile without any music on a different day. Their ½ mile times, HR and RPE will be recorded each day following the run. This data will be collected at the University of Dayton Campus Recreation track. The testers will be standing with the stopwatch to measure time and the Borg scale to gauge RPE. Each participant will meet us at this location while wearing athletic clothing and running shoes, and will bring headphones with them. They will start off by warming up through a five minute dynamic stretching routine. We will be placing the Polar heart rate monitor on them, taking their resting HR as well as explaining the RPE scale in detail.

For the first trial, the subjects will run with no music for four consecutive laps around the track in the outermost lane while the tester stands at the starting point with a stop-watch to time the trial. For the second trial, the subjects will be running to the song “Call on Me-Ryan Riback Remix” around the track for four consecutive laps in the outermost lane. After each trial, the testers will record RPE and HR. Following the completion of both trials, the subjects will be asked the planned questions and their responses will be recorded. We are collecting both qualitative and quantitative data. For our quantitative data, we are recording our subjects HR, RPE, and running time. For qualitative data, we will be asking these questions of our subjects: which trial did you find easier to complete? Do you normally listen to music during regular workouts? These questions were developed in order to gain a better understanding of where each of our subjects falls in our sampling group as a whole.

## RESULTS



- There was significant evidence proving the positive effect of music on at least some of the several variables tested throughout this investigation. The variables studied included HR, RPE and running pace.
- Of these three variables, our quantitative data demonstrated that the majority of people had a shorter running pace and a lower RPE while listening to music. The data also demonstrated that HR is higher when listening to music.
- Out of 20 participants, the average half mile time without listening to music was three minutes and thirty five seconds whereas, the average half mile time while listening to music was three minutes and twenty eight seconds.
- The average RPE without music was 6.15. On the other hand, the average RPE with music was 5.60.
- The average resting heart rate out of the twenty participants was 66.95 BPM.
- The average final HR following the trial without music was 165.60 BPM, meanwhile the the average final HR following the trial with music was 174.00 BPM.
- 90% of participants reported that they listen to music with headphones while they exercise.
- 75% of participants reported that the trial with music was easier.

	Variable	Paired Differences					t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	Time	-1783.33	4493.88	980.65	-3828.92	262.26	-1.82	0.084
Pair 2	Heart Rate	-8.40	10.04	2.191	-12.97	-3.83	-3.83	0.001
Pair 3	RPE	0.500	0.97	.212	0.11	0.99	2.59	0.018

## CONCLUSIONS

Overall, music has proven to be an aid for those seeking improvements in their performance. Our study concluded that music has a positive effect on running pace as well as RPE. All twenty participants decreased their running time during the trial including music, the smallest difference being two seconds and the greatest deviation being fourteen seconds. Thirteen of the twenty participants gave a lower RPE while running with music compared to running without music. Music has many diverse and positive effects that help different aspects on performance. This study has shown a direct correlation between listening to music and performance. After researching various experiments and studies with similar results, we are confident that we have found enough background to conclude that listening to music is beneficial in increasing pace and lowering RPE.

## DISCUSSION

Athletes, fitness enthusiasts, and first-timers alike are constantly working towards overall improvement. Whether that be in weight lifting, cycling, endurance running, etc., those involved in the fitness industry are always searching for the most effective ways to improve their personal fitness records. While there are many different ways for people to work towards those goals, the training method under investigation was the effect of music on running pace, RPE, and HR.

This investigation is important for people who currently exercise often, those who are looking to get back into shape as well as those who are looking to begin exercise programs for the first time. By comparing the effect of listening to music to the effect of not listening to any music on running pace, RPE, and HR, both the benefits and setbacks of running with or without music have been presented. Music can be used as both a motivational tool for those striving to complete rigorous bouts of exercise, as well as a form of distraction which can cause the exercise to be perceived as less difficult by the participant. When utilized advantageously, music can simply be the difference between a gold and silver Olympic medal, for example.

Our primary hypothesis was that the utilization of music as a form of sensory deprivation will have a significant impact on the rating of perceived exertion as well as on overall performance and running pace. Secondly, we tested whether or not listening to music during exercise will cause any significant changes in HR. The data collected during this investigation proved our hypothesis that music will lower running pace and RPE.

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